

## Geophysical Approach for the Wilcox Refinery Bristow, Oklahoma

In the meeting it was discussed whether it would be practical to run multiple EM31 and EM61 teams. Since the EPA has no plans to cut much of the brush in the “Process” areas, there may not be enough accessible area to warrant two crews. This approach is based on having three teams total, one seismic, one EM31 Team and one EM61 Team. The cost estimate is also based on these three teams. Adding the two additional teams will be addressed as an additional cost to be considered as an increment, if desired.

Each field day is based on (b) (4). It is initially assumed that we would not be working on the weekends – so the total field days are (b) (4) per person. Per diem has been included for the weekend days.

There are two additional days estimated for the equipment rental. The rental companies charge an extra day on the front and a day on the end of each rental.

### **Mobilization**

There was not a lot of consensus as to what equipment is coming from where. Stewart was hesitant to use the EPA seismograph. It is more than 20 years old and he didn’t feel it was reliable. This approach was assembled assuming everything came from Exploration Instruments out of Austin, TX. If we get all of the equipment from them- we will have two techs fly into Austin and pick it up and drive it to Oklahoma in time to match our field start. Shipping and insurance on this equipment would probably total about \$4,000 to \$5,000 each way. We prefer it not fly if possible, we’ve all seen how baggage handlers treat boxes, especially those marked fragile.

The Cincinnati office has an EM31 and EM61, and there was talk of having the folks in that office drive it all down. If these two units are brought to site, they would be used as spares (which are often needed in Geophysics) or they could be used for the additional two teams, if a decision is made to go that route.

We assumed each person (b) (4) hours mobilization and (b) (4) demobilization. We expect to have people coming from Edison, NJ, Harrisburg, PA, Houston Tx and Virginia/Maryland via BWI or Dulles.

### **EM31 and EM61 surveys:**

The EM surveys are planned for the Process and North Process areas. The objective in these areas is to locate utilities, leftover foundations, tanks or whatever objects might be left in the ground. They do not plan to do much brush cutting, maybe just a few transects. The bulk of the work will be along trails and old roads. However, if it is decided that additional work be done in these areas, SERAS can rent equipment and perform additional clearing. This clearing will be limited by existing equipment, foundations, and structures.

We assumed a two man crew for each survey team. Beth tries to budget for 2-3 miles of data collection a day, and in this type of environment she feels that we’ll be closer to the 2 miles per

day. Based on the size of the Process areas, we don't think there are 20 miles of data available out there. Therefore we don't believe a second set of EM teams is worth the cost. However, as previously stated, we suggest that it would be advantageous to have an extra set of EM instruments on the site (the Cincinnati instruments).

### **MASW Seismic**

The MASW is planned for the Tank Farm Area. This area is mostly all open grass fields. The objective is to find preferential pathways in the bedrock and determine the depth of the bedrock surface because it varies across the site from 2 feet below the ground to greater than 30 feet. The owner of the Tank Farm property has agreed to mow the grass a few days before we get there to make it easier for us.

Beth assumed a three man crew for the seismic. The extra person is a big asset to getting more completed in a day. Two field people will serve as the crew, and then Stewart or Beth alternately as the third person. When one is not with the seismic crew the other would be roaming back and forth with the EM crews to make sure everything is running smoothly.

Based on the objectives for this survey- our geophones will be spaced three feet apart and we will collect a shot at every 9 feet. So we would collect about 1500 feet of seismic per day (give or take).

A figure is attached with some proposed traverse locations. There are two seeps that the client wants to investigate- find the pathway from the sources over to the seep. It is suggested that we concentrate the first few days in that area to determine what is going on- then spend the rest of the field days doing as many traverses as we can.

One of the seeps is in the Process Area, looking at the current aerial photograph, we might be able to squeeze an MASW line in there. We won't know that for certain until we are on the site. If we can do it, we think we should.

At the end of each day, Beth will upload the MASW data to an offsite Geophysicist who can preliminarily process the data to make sure we are meeting the objectives. We can look on the screen in the field to determine that we are getting good signal and good data, but we can't really determine if we are meeting objectives without running it through the software. It should be done at the end of the first day as a minimum and then perhaps daily because definitely don't want to come to the end of the 2 weeks and find out the data quality is not sufficient.

### **Report**

Stewart and Beth like to use the rule of thumb- for every day in the field budget two in the office. Time is estimated for Beth to assume responsibility of getting the report written and the figures drafted up, then to Stewart for his input and review, then in to ERT and the client.

### **Items of Interest**

On the figure with the proposed first set of traverses, Beth overlaid the topographic map. You'll notice the two seeps look like they fall on fracture traces and stream notches.

We also have to be clear, and we think everyone knows this already, that approaching storms wreak havoc on geophysical equipment. So with approaching storms we will have to shut down and wait for them to clear.

### Cost Estimate

The budgetary cost estimate is attached and includes the assumptions above and those bulleted below.

- EM and Seismic instruments will be rented in Austin, TX and driven to the site.
- The field crew consists of Beth Williams, Stewart Sandberg, Chris French, Joe Policastri and four additional technicians or P1 level scientists.
- It is assumed that the field activity will run for two weeks beginning on July 20, 2015.
- The Initial estimate is based on three field crews, plus Beth and Stewart. Additional crews can be added resulting in additional cost.
- The current estimate assumes field work (b) (4) days per week, but this can be expanded to (b) (4) days for a total of (b) (4) days of surveying rather than (b) (4). Incremental cost to do that will only be the labor hours for the extra day(s).
- Vehicle rental will include a van to transport the instruments from the rental house in Austin to site and back, an SUV or van for transporting personnel and a pickup truck for use on site. SERAS Personnel will number 8 in the base plan with the option to add 4 more.
- Per Diem is based on \$83/\$46 hotel/meals.
- An allowance has been made in the estimate to rent a Bobcat with Bush Hog attachment for additional brush clearing if needed.
- The Estimated LOE and Costs for the base, with three crews as discussed above is:
  - (b) (4) Total hours LOE
  - Materials and services are estimated at \$18,800 plus contract markups.
  - Travel is estimated at \$32,200 plus contract markup.
  - **Total estimated costs, including LOE and all markups is \$197,172.**
- As noted above, if we add two additional crews for the EM31 and EM61, it will add four people to the project, resulting in twelve in the field rather than eight.
  - the additional costs will include
  - Four airfares
  - One SUV
  - Per Diem for fifteen days
  - (b) (4) hours
  - **Estimate that the additional cost for these two additional teams is \$ 45,021.**

These are budgetary numbers and while fairly accurate, are conservative. It is likely that a detailed cost estimate will be somewhat lower upon submittal with the Work Plan.